SPECIFICATION

o Amend the Title of the Invention beginning at page 1, line 1, as follows:

~~METHOD AND APPARATUS FOR EFFICIENT AUDIO COMPRESSION~~
MULTI-PULSE SPEECH CODING/DECODING WITH REDUCED CONVOLUTION PROCESSING

o Amend paragraph beginning at page 7, line 9, as follows:

Fig. 4 depicts an exemplary excitation signal v[*n*] that, when convolved with a ~~complimentary~~ complementary impulse response h[*n*], can represent a signal such as the residual signal of Fig. 3. As shown in Fig. 4, the excitation signal can contain six individual pulses ~~350-360~~ 340-350 distributed at various points along the time-axis 320. The exemplary pulses ~~350-360~~ 340-350 (denoted by $a_k\delta[n-m_k]$, for k = 0, 1, ..., 5) have an amplitude of $a_k = \pm 1$ and can be located at positions $\delta[n-m_k]$ where $0 \leq m_k \leq 59$ according to an MP-MLQ protocol. However, it should be appreciated that the particular number, characteristics and distribution of pulses can vary as desired or otherwise required by design without departing from the spirit and scope of the present invention.

o Amend paragraph beginning at page 7, line 18, as follows:

As discussed above, once an excitation signal v[*n*] is synthesized, the excitation signal can be convolved with a ~~complimentary~~ complementary impulse response h[*n*] to ~~produced~~ produce a quantized residual signal. The quantized residual signal can then be compared to a known signal, such as an original, or target, residual signal. If the difference between the quantized residual signal and the original residual signal ~~are~~ is small enough, it should be appreciated that the excitation signal v[*n*] and ~~complimentary~~ complementary impulse response h[*n*] can represent a compressed form of the original residual signal r[*n*].

o Amend paragraph beginning at page 7, line 25, as follows:

However, if the difference between the quantized residual signal and the original residual signal increases, the excitation signal v[*n*] and ~~complimentary~~ complementary impulse response h[*n*] are less capable of representing the original residual signal and thus, another combination of pulses might be better suited to represent the original residual signal.

o Amend paragraph beginning at page 8, line 9, as follows:

In operation, and under control of the controller 410, the input interface 480 can receive a residual signal r[*n*] and ~~complimentary~~ complementary impulse response signal h[*n*] and store the signals in the memory 420. The memory 420 stores the residual signal, ~~complimentary~~ complementary impulse response signal and other data generated during processing.

o Amend paragraph beginning at page 8, line 13, as follows:

In various exemplary embodiments, the residual signal contains a stream of sixty digital values according to the ~~G.732.1~~ G.723.1 codec standard. However, it should be appreciated that the particular format of the residual signal as well as the format of the impulse response signal can vary as desired or otherwise required by design without departing from the spirit and scope of the present invention.

o Amend paragraph beginning at page 8, line 18, as follows:

Next, the pulse combination generator 430 generates a pulse stream. In various embodiments, the exemplary pulse combination generator 430 can generate pulse streams according to the ~~G.732.1~~ G.723.1 codec standard. Accordingly, in various exemplary embodiments, the pulse stream can be an MP-MLQ excitation signal containing sixty values with five or six of the values being ±1 and the remaining values being zero.

o On page 11, amend line 7 of Table 2 as follows:

7. for (j = 59; [[j <= 0]] j >= 0; j--) /* convolution loop */

o Amend paragraph beginning at page 11, line 10, as follows:

The gain device 450 can receive the quantized residual signal and generate a series of ~~complimentary~~ complementary gain values *G* based on the received quantized residual signal. While the gain device 450 generates gain values according to the ~~G.732.1~~ G.723.1 specification, it should be appreciated that the gain device 450 can generate gain values according to any known or later developed technique without departing from the spirit and scope of the present invention. Once the gain device 450 has generated its gain values, the gain device 450 provides these values to the error determining device 460.

o Amend paragraph beginning at page 13, line 11, as follows:

In operation, and under control of the controller 510, for a particular frame of speech, the input interface 580 can receive a pulse stream such as an excitation signal v[*n*], a gain signal *G*, an impulse response signal h[*n*] and a set of LPC coefficients (a_1, a_2, ..., a_M), and store the signals in the memory 420. The memory ~~520~~ 420 stores the various received signals and other data generated during processing. Next, the controller 510 can provide the LPC coefficients to the filter generator 530, the pulse stream and impulse response to the convolution device 540 and the gain value to the speech processor 550.

o Amend paragraph beginning at page 14, line 4, as follows:

Figure 7 is a flowchart outlining an exemplary operation for quantizing a waveform such as a codec residual signal. The operation begins in step 600 where a residual signal and complementary impulse response for a frame of speech are received. Next, in step 610, a first pulse stream, i.e., excitation signal is generated. The exemplary residual signal, impulse response and excitation signal conform to the ~~G.732.1~~ G.723.1 codec standard. However, the formats of the residual signal, impulse response and excitation signal can vary to any known or later developed communication standard, without departing from the spirit and scope of the present invention. The process continues to step 620.

o Amend paragraph beginning at page 15, line 9, as follows:

Figure 8 is a flowchart outlining an exemplary operation for efficiently synthesizing a frame of speech. The operation begins in step 800 where a quantized residual signal including at least an excitation signal and complementary impulse response for a frame of speech are received. Next, in step 810, a set of LPC coefficients are received. The exemplary excitation signal, impulse response and LPC coefficients correspond to the ~~G.732.1~~ G.723.1 codec

standard. However, the formats of the various signals and coefficients can vary to any known or later developed communication standard, without departing from the spirit and scope of the present invention. The process continues to step 820.

o Amend paragraph beginning at page 15, line 25, as follows:

In step 830, an LPC decoder filter/process is generated based on the received LPC coefficients. Next, in step 840, the quantized residual signal generated in step 820 is processed using the LPC filter of step 830 to synthesize a frame of speech. Then, in step 850, the frame of synthesized speech is exported and the process stops in step 860.